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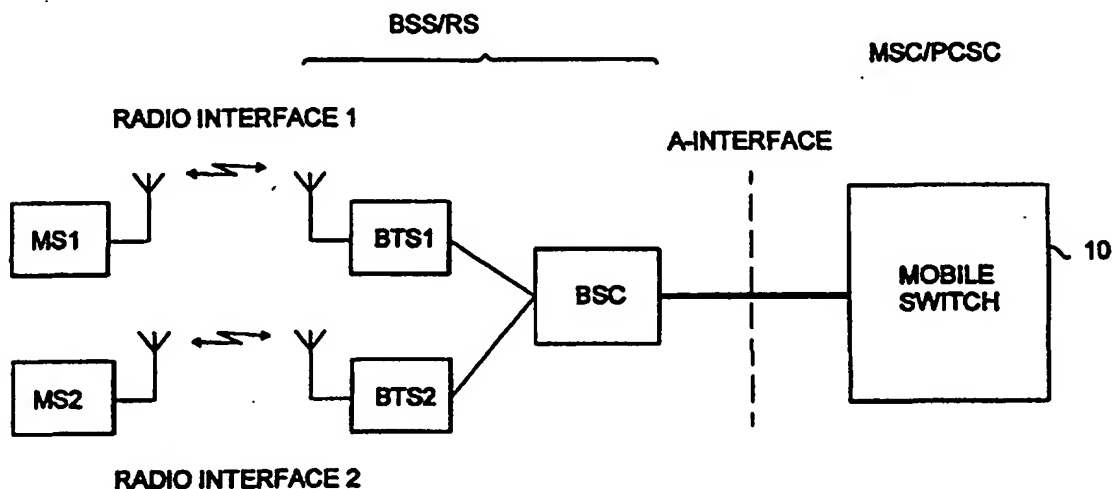
(57) Abstract

In mobile radio systems, it may be necessary to support multiple radio interfaces (1, 2) within a single mobile radio network. To support these multiple radio interfaces, it may be necessary to support even multiple signalling protocols within a single interface (A-interface) between a base station controller (BSC) and a mobile switch (10), when base stations (BTS1, BTS2) supporting different radio interfaces are connected via a common base station controller (BSC) to the mobile switch (10). The mobile switch (10) and the base station controller (BSC) must be capable of recognizing to which signalling protocol a message transfer in the single interface belongs to. According to the present invention the messages transferred in the single interface (A-interface) are provided with a discrimination parameter which can be used to discriminate between the messages belonging to different radio interfaces (1, 2) and signalling protocols.

Support of multiplicity of radio interfaces over an inter-
face between a base station system and a mobile switch

Field of the invention

5   The present invention relates to mobile radio sys-
tems, and particularly to a mobile radio system supporting
multiple radio interfaces and signalling protocols.

Background of the invention

The conventional mobile radio systems are typically
10   intended to support a single radio interface between base
stations and mobile stations all over the mobile network.
Similarly, a single signalling interface supporting the
radio interface is employed between a mobile switch and a
base station system, i.e. a base station controller and
15   base stations. In future mobile radio systems, however, it
may be necessary to support multiple radio interfaces
within a single mobile radio network. To support these
multiple radio interfaces, it is necessary to support mul-
tiple signalling protocols within a single signalling in-
20   terface between the base station controller and the mobile
switch. This is the case, when base stations supporting
different air interfaces are connected via a common base
station controller to a mobile switch. If these different
radio interfaces utilize different signalling protocols,
25   the mobile switch must be capable of recognition to which
signalling protocol the received message belongs. This is
required in order to facilitate the mobile switch to
select the right signalling protocol for further com-
munication between network elements. Naturally, similar
30   separation is needed also for signalling messages from the
mobile switch to the base station system.

One example of conventional mobile radio systems
is Paneuropean digital mobile radio system GSM (Global
System for Mobile Communication). The interface between
35   base station controller and the mobile switch is called A-

interface in the GSM system. Intefaces very much similar
to the GSM A-interface will, apparently, be standardized
for personal communications systems (PCS). It is expected
that supporting multiple radio interfaces will be needed
also in PCSs.

Disclosure of the invention

It is therefore an object of the present invention
to provide a mobile radio system supporting multiple radio
interfaces over a single signalling interface between the
base station system and the mobile switch.

It is another object of the invention to enhance
the GSM specific A-interface to support multiple radio
interfaces and their signalling protocols.

In order to support one radio interface the single
interface between the base station system and the mobile
switch has to include a signalling protocol which contains
a number of signalling messages, called herein as a
message group. If a single mobile radio system supports
only one radio interface, the single signalling interfaces
between the base station system and the mobile switch
includes only one message group and no separation between
message groups is needed. The case is different, when a
mobile radio system supports multiple radio interfaces,
and the single signalling interface includes several
message groups, one group for each radio interface.
According to the present invention the messages in a
single signalling interface are provided with a
discrimination parameter which can be used to separate to
which signalling protocol and radio interface the messages
belong to. A dedicated discriminator parameter value is
allocated for each radio interface. In other words, the
discriminator parameter value associated with each message
is radio interface specific. For example, when generating
messages to be sent to the mobile switch, the base station
system allocates an appropriate discrimination parameter

value for the message. The discrimination parameter value
of the message received from the base station system is
then checked by the mobile switch in order to identify the
signalling protocol, the radio interface and the message
group to which the message belongs. Same mechanism cn be
used in the signalling from the mobile switch to the base.
station system.

The GSM based A-interface between the base station
controller and the mobile switch comprises an intermediate
distribution sublayer located between the transport layer
and upper layer carrying signalling messages. The protocol
of this sublayer consists of distribution data unit, which
includes a discrimination parameter field. Conventionally
the distribution sublayer and the discrimination parameter
field is used to distribute the messages into DTAP (Direct
Transfer Application sub-Part) and BSSMAP (Base Station
System Management Application sub-Part) messages defined
in the GSM specifications or RSMAP (Radio System
Management Application Part) in PCS system. According to
the present invention the GSM specific A-interface is
enhanced by using one or more of remaining bits in the
discrimination parameter field to identify and separate
message groups and radio interfaces in mobile radio
systems supporting multiple radio interfaces and
associated signalling protocols. The inventive use of
discrimination parameter field facilitates a flexible
protocol structure of the A-interface when multiple radio
intefaces are supported. Further evolution of a single
message group is feasible without affecting other message
groups. Moreover, support for new radio interfaces and new
message groups can be added by allocating new DP values.
The support of multiple air interfaces over the GSM
specific A-interface is not necessarily more complicated
than the support of a single radio interface, because an
essential part of the messages are same for all radio

interfaces, and thus can be managed in a similar way.

Brief description of the drawings

Preferred embodiments of the present invention will now be described in conjunction with the accompanying drawings, in which

Figure 1 depicts a mobile radio communication system including a single interface between base station system and the mobile switch and supporting multiple radio interfaces, according to the invention,

Figure 2 depicts a signalling protocol reference model of the A-interface according to the GSM specifications,

Figure 3 depicts the user data field of the SCCP unit data message for carrying BSSMAP/RSMAP messages,

Figure 4 depicts a structure of the user data field of the SCCP unit data message for carrying DTAP messages,

Figure 5 illustrates multiple message groups of the A-interface supporting multiple radio interfaces,

Figure 6 depicts the signalling protocol reference modele of the A-interface supporting multiple radio interfaces, according to the invention,

Figures 7, 8 and 9 illustrate discrimination parameter field values allocated for the radio interface 1, the radio interface 2 and the radio interface 3, respectively, in Figure 6.

Discription of the preferred embodiments

The present invention can be applied in various mobile radio communication systems for providing a single interface between a mobile switch and a base station system supporting two or more radio interfaces. The present inventionis especially suitable for enhancing the GSM specific A-interface, or in any other interface substantially similar to the A-interface, to support multiple radio interfaces and their signalling protocols.

In the United States is under development a Personal

Communication System PCS under standard draft PN-3343. The
A-interface in PCS according to PN-3343 will be
substantially similar to the GSM spcific A-interface. The
preferred embodiments of the present invention will be
5   described when applied in the GSM-specific A-interface,
PN-3343 A-interface or a similar interface. The present
invention is not, however, intended to be restricted to
this specific type of interface.

        In the following the GSM specific terminoly will be
10   used.   The main differencies between the terminology of
the GSM system and the PCS system will be mentioned.

        The basic structure and basic operation of the GSM
mobile radio system are well known by persons skilled in
the art and detailly defined in the specifications of the
15   GSM system. For detailled description of the GSM system, a
reference made to the ETSI GSM specifications and to a
book "The GSM System for Mobile Communications", M. Mouly
& M. Pautet, Palaiseau, France.

        A mobile radio system with multiple air interfaces
20   is shown in Figure 1. A mobile switch 10 (a mobile
services switching centre MSC in GSM system, a personal
services switching center PCSC in the PCS system) switches
incoming and outgoing calls. Its functions are partly
similar to those of an exchange in a fixed telehone
25   network. In addition the mobile switch 10 has functions
typical to only mobile communications, such as subscriber
location management, paging, authentication, etc. Mobile
radio stations MS (Personal Station PS in PCS system) are
connected to the mobile switch 10 by means of base station
30   systems BSS (a Radio System RS in PCS system). A base
station system BSS comprises a base station controller BSC
and base stations BTS. A single base station controller
BSC is used for controlling a plurality of base stations
BTS. In Figure 1 a base station system BSS is shown in
35   which the BSC is connected to two base stations BTS1 and

BTS2. Base stations BTS1 and BTS2 are supporting different radio interfaces 1 and 2, respectively. The type and exact implementation of the radio interface is not essential to the present invention. Examples of different radio interfaces include PCS 1900 air interface, IS-95 based Air interface PN-3384, and PCS2000 Air interface. A first group of mobile stations MS, such as MS1, are capable to communicate using the radio interface 1, and therefore, the base station BTS1. A second group of mobile stations MS, such as mobile station MS2, is capable of communicating using radio interface 2, and therefore, base station BTS2. These base stations BTS1 and BTS2 are connected via a common base station controller BSC to the mobile switch 10. The single interface between the BSC and the mobile switch 10 is a GSM based A-interface or a PCS specific A-interface PN-3343. If the different air interfaces 1 and 2 utilize different signalling protocols, the mobile switch 10 must be capable of recognizing to which signalling protocol the message received via A-interface belongs. This is required in order to facilitate the mobile switch 10 to select the right signalling protocol for further communication between network elements.

In order to implement this, a discrimination parameter field according to the invention is provided and associated with each of the messages transferred over the interface between BSC and the mobile switch 10. In other words the base station controller BSC allocates a dedicated discrimination parameter field value (radio interface specific) for each message. This discrimination parameter field value will be then checked by the mobile switch 10 to thereby identify the signalling protocol and the message group (i.e. the radio interface) to which the received message belongs.

In order to facilitate understanding of the present

invention, the conventional GSM specific A-interface supporting a single radio interface will be first described with reference Figures 2, 3 and 4. The PCS specific A-interface PN-3343 is based on the GSM specific A-interface.

Figure 2 illustrates the signalling protocol reference model of A-interface between the mobile switch 10 and the base station system BSS (or Radio System RS).

The A-interface is based on ANSI/CCITT signalling system number 7 (SS7) having several layers: SCCP, MTP and physical layer. The bottom layer in Figure 2 is the physical layer. In case of a digital link being used between the BSC and the mobile switch 10, the signalling of fysical layer will be carried in one of 56 or 64 kbits/s time slots. The next upper layers in the A-interface are message transfer part (MTP) and signalling connection and control part (SCCP). The MTP and SCCP are used to support signalling messages between the mobile switch 10 and the BSS.

One user function of the SCCP, called BSS application part (BSSAP) is defined (Radio System application part in the PCS system). The BSSAP (or RSAP) uses one signalling connection per active mobile station MS having one or more active transactions, for the transfer of layer 3 messages. The BSSAP (RSAP) user function is further subdevided into two separate functions:

- the direct transfer application sub-part DTAP is used to transfer call control and mobility management messages between the mobile switch 10 and the MS. The DTAP information in these messages is not interpreted by the BSS. Technical specification GSM 08.06 contains more detail relating to the handling of DTAP messages at the BSS, the multiplexing of the messages on the relevant signalling channels of the radio interface and the use of

the SCCP services. The descriptions of the layer 3 protocols for the MS-MSC information exchange are contained in the 04-series of GSM technical specifications.

5   - the BSS management application sub-part BSSMAP (a rasio system management application part in the PCS) supports other procedures between the mobile switch 10 and the BSS related to the MS (resourse management, handover control), or to a cell within the BSS (or the radio system

10   RS), or to the whole BSS. In other words, BSSMAP (RSMAP) supports all the procedures between the mobile switch 10 and the BSS (RS) that require interpretation and processing of information related single calls, and resource management.

15   The discrimination between the messages related to these two sub-parts DTAP and BSSMAP (RSMAP) is performed in an intermediate layer between SCCP and layer 3. This intermediate layer is referred as the distribution sublayer or the distribution function.

20   DTAP and BSSMAP (RSMAP) layer 3 messages between the mobile switch 10 and the BSS (RS) are contained in the user data field of the exchanged SCCP messages. The structure of the user data field of the SCCP unit data message is shown in Figures 3 and 4 for carrying BSSMAP

25   (RSMAP) and DTAP messages, respectively. As shown in Figures 3 and 4 the user data field contains, in both cases, a distribution data unit, a length indicator, and the actual layer 3 message. Each SCCP user data field further contains a distribution data unit as a header. In

30   case of BSSMAP (RSMAP) messages the distribution data unit only consists of discrimination parameter, as shown Figure 3. In case of DTAP messages the distribution unit consists of two parameters, the discrimination paramater and the data link connection indication (DLCI) parameter. The

35   latter parameter is not essential for the present

invention and will not be described more detailly.

In both cases, the discrimination parameter is
coded on one octet as shown in Figure 7. One bit of the
discrimination parameter, referred as a discrimination bit

5   D, indicates whether the layer 3 message in the SCCP user
data field is a DTAP message (D = 1) or BSSMAP (RSMAP)
message (D = 0). The discrimination bit D is normally the
least significant bit. In the GSM specific discrimination
parameter value the remaining bits are set zero.

10   The distribution data unit is used by the
distribution sublayer between SCCP and layer 3 for
distribution of messages between the BSSMAP (RSMAP) and
DTAP functions and the distribution/multiplexing of DTAP
messages to/from the various radio link layer 2 access

15   points.

As noted before, the conventional GSM specific A-
interface supports only one radio interface and signalling
protocol.

According to the preferred embodiment of the

20   present invention the GSM based A-interface, such as PCS
specific A-interface, is enhanced to support two or more
radio interfaces and their signalling protocols. This is
achieved by utilizing the remaining bits in the
discrimination parameter field DP to indicate the radio

25   interface and the associated signalling.protocol to which
the layer 3 message belongs.

In order to support one radio interface, the A-
interface has to include a signalling protocol which
contains a number of messages, referred herein as a

30   message group. A message group is radio interface
specific. Each group comprise both DTAP and BSSMAP (RSMAP)
messages to the radio interface. If the A-interface has to
support only one radio interface, only one message group
is required. In this case the implementation of the A-

35   interface and the value of the discrimination parameter

may be similar to the conventional A-interface.

If the mobile radio system and the A-interface support multiple radio interfaces, also several signalling protocols and thereby several message groups are required.
Figure 5 illustrates multiple message groups of the A-interface supporting multiple radio interfaces. Some messages MSG are common to all message groups. In addition to these messages, each group may include messages and information elements, mandatory or optional, that are not supported by other message groups. The essential part of the messages can be common to all air interfaces and message groups, and thus can be managed in a similar way. Signalling protocols and message groups can be easily added into and removed from the A-interface. Therefore, a single network may comprise different versions of the A-interfaces supporting different combinations of radio interfaces and their signalling protocols.

According to the invention a dedicated discrimination field value is assigned for each message group (radio interface). For example, as illustrated in Figures 7, 8 and 9, a discrimination field value 0000000D may be assigned for radio interface 1 messages, 1000000D for radio interface 2 messages, and 0100000D for radio interface 3 messages. In other words bits 7 and 8 of the discrimination field are utilized to identify the radio interface. Naturally, any free bits in the discrimination parameter field can be for this purpose, for example bits 2 and 3. The discrimination bit D is used in a normal manner for discrimination between DTAP (D=1) and BSSMAP/RSMAP (D=0) messages.

The structure and operation of the A-interface according to the preferred embodiment of the invention will be now described with reference to Figure 6. Figure 6 shows a signalling protocol reference model of the A-interface according to the present invention. The physical

layer as well as the layer 2 protocol MTP and SCCP are similar to the same layers in Figure 2 and require no modifications for the implementation of the present invention. The BSS application part BSSAP (or RSAP)

5   supports three different radio interfaces in Figure 6, namely radio interfaces 1, 2 and 3. In order to implement this, the BSSAP/RSAP comprises a dedicated pair of DTAP and BSSMAP functions for each radio interface. As a consequence there are three pairs of DTAP and BSSMAP/RSMAP

10   functions in the BSSAP/RSAP in Figure 6.

The intermediate distribution sublayer, or a distribution function, is located between the SCCP and the layer 3 functions DTAP and BSSMAP/RSMAP. The basic function of the distribution sublayer is the same as in

15   Figure 2: the distribution of SCCP messages between the BSSMAP and DTAP functions. The DTAP and BSSMAP/RSMAP layer 3 messages between the mobile switch 10 and the BSS are again contained in the user data field of the exchanged SCCP messages. The user data field used in the A-interface

20   according to the invention is similar to the user data field shown Figures 3 and 4 for BSSMAP/RSMAP and DTAP messages, respectively. Each user data field again contains distribution data unit which includes the discrimination parameter which indicates whether the layer

25   3 message in the user data field is a DTAP message (the discrimination bit D = 1) or a BSSMAP/RSMAP message (D = 0).

However, since the A-interface supports three interfaces 1, 2 and 3, and there are a dedicated pair of

30   DTAP and BSSMAP/RSMAP functions for each radio interface, a dedicated value of the discrimination parameter is assigned for each radio interface. More particularly, a distribution parameter value 0000000D (Fig.7) is assigned for radio interface 1, 1000000D (Fig.8) for radio

35   interface 2, and 0100000D (Fig. 9) for the radio

interaface 3. The value of the distribution parameter is utilized to discriminate the messages between the pairs of DTAP and BSSMAP/RSMAP functions of the different radio interfaces, and the distribution bit D is utilized in a conventional manner to discriminate the messages between DTAP and BSSMAP/RSMAP functions within each pair.

Similar reference models as shown in Figure 6 can be found at both ends of the A-interface, i.e. in the base station controller BSC and the mobile switch 10.

The operation of the A-interface according to the invention will now be described with an illustrating example in which a DTAP message belonging to the radio interface 3 is transferred from the base station controller BSC to the mobile switch 10 via the A-interface according to the invention. Firstly, a DTAP message is received from the radio interface 3 by the appropriate DTAP function, and inserted to a user data field of an SCCP message via the distribution sublayer. The distribution sublayer knows that the message in the user data field is a DTAP message from radio interface 3, and consequently, sets the discrimination parameter in the user data field to the value 01000000 (cf. Fig. 9). Then the SCCP message is tranferred from the BSC to the mobile switch 10 via the A-interface. At the mobile switch 10 the distribution sublayer checks the value of the discrimination paramater field in the received SCCP message. The value 01000000 indicates that the layer 3 message is a DTAP message from radio interface 3, and the distribution sublayer delivers the message to the DTAP function of the radio interface 3. Similarly, any DTAP and BSSMAP message belonging to the message groups of radio interfaces 1, 2 and 3 can be transferred between the BSS and the mobile switch 10 in both directions, by using the appropriate discrimination parameter field value allocated to the specific message type and radio interface.

The foregoing description shows only preferred embodiments of the present invention. Various modifications are apparent to those skilled in the art withoud departing from the spirit and scope of the present invention defined by the appended claims.

Claims

1. A mobile radio system, comprising
mobile stations,

5   a mobile switch,
a base station system supporting multiple radio
interfaces for communication between said base station
system and said mobile stations,
a dedicated signalling protocol associated with

10   each of said multiple radio interfaces,
a single signalling interface between said mobile
switch and said base station system, said single
signalling protocol supporting each of said dedicated
signalling protocols,

15   a discrimination parameter used separating
signalling messages belonging to different signalling
protocols from each other, said discrimination parameter
being associated with each signalling message transferred
through said single signalling interface for indicating

20   the signalling the signalling protocol said message
belongs to.
2. A mobile radio system, comprising
mobile stations,
.a mobile switch,

25   a base station system supporting a first radio
interface for communication with a first group of said
mobile stations and a second radio interface for
communication with a second group of said mobile stations,
a first signalling protocol and a first group of

30   signalling messages associated with said first radio
interface,
a second signalling protocol and a second group of
messages associated with said second radio interface,
a single signalling interface between said mobile

35   switch and said base station system, said single

signalling protocol supporting each of said dedicated
signalling protocols,

    a discrimination parameter used for separating said
first and second groups of signalling messages belonging
5   to different signalling protocols from each other, said
discrimination parameter being associated with each
signalling message transferred through said single
signalling interface for indicating the signalling the
signalling protocol said message belongs to.

10   3. A mobile radio system, comprising
        mobile stations,
        a mobile switch,
        a base station system supporting a first radio
interface for communication with a first group of said
15 mobile stations and a second a second radio interface for
communication with a second group of said mobile stations,
        a single signalling interface between said mobile
switch and said base station system, said single
signalling interface comprising
20   an upper signalling layer
        comprising a first group of signalling messages
        corresponding to said first radio interface for
        signalling between said mobile switch and said base
        station system over said single signalling
25   interface, and a second group of signalling
        messages corresponding to said second radio
        interface for signalling between said mobile switch
        and said base station system over said single
        signalling interface,
30   a lower signalling layer for
        carrying said upper signalling layer messages in an
        user data field of a lower layer message over said
        single signalling interface,
                said user data field of said
35   transfort layer message further containing a

discrimination parameter, one or more bits of said discrimating parameter indicating whether said message in said user data field of said lower layer message belongs to said first group of messages or to said second group of messages,

an intermediate layer between said lower layer and said upper layer for managing said discrimination parameter and for discrimination between said upper layer messages belonging to said first and second groups of messages.

4. A mobile radio system, comprising

mobile stations,

a mobile switch,

a base station system supporting a first radio interface for communication with a first group of said mobile stations and a second a second radio interface for communication with a second group of said mobile stations,

a single signalling interface between said mobile switch and said base station system,

a first group of signalling messages corresponding to said first radio interface for signalling between said mobile switch and said base station system over said single signalling interface,

, a second group of signalling messages corresponding to said second radio interface for signalling between said mobile switch and said second base station system over said single signalling interface,

said single signalling interface comprising

a first direct transfer application sub-part DTAP for transferring DTAP messages in said first group of messages between said mobile switch and said first group of said mobile stations via said single signalling interface and base station system,

a first base station system

management application sub-part BSSMAP for
transferring BSSMAP messages in said first group
messages between said mobile switch and said base
station system,

5   a   second   direct   transfer
application sub-part DTAP for transferring DTAP
messages in said second group of messages between
said mobile switch and said second group of said
mobile stations via said single signalling
10   interface and base station system,

a second base station system
management application sub-part BSSMAP for
transferring BSSMAP messages in said second group
messages between said mobile switch and said base
15   station system,

a single signalling connection and
control part SCCP for transferring said DTAP and
BSSMAP messages in an user data field of a SCCP
message over said single signalling interface,

20   said user data field of said SCCP
message containing a distribution data unit, a
lenght indicator and said DTAP or BSSMAP message to
be transferred,

said   distribution   data   unit
25   containing a discrimination parameter, at least one
bit of said discrimination parameter indicating
whether the message in said user data field of said
SCCP message is a BSSMAP message or a DTAP message,
and one or more of the remaining bits of said
30   discrimating parameter indicating whether said
message in said user data field of said SCCP
message belongs to said first group of messages or
said second group of messages,

an intermediate layer between the
35   SCCP and DTAP and BSSMAP and for managing said

discrimination parameter and for discrimination between said DTAP and BSSMAP messages belonging to said first and second groups of messages.

5. A mobile radio system according to claim 4, wherein said intermediate layer is responsive to said discrimination parameter in a received SCCP message to distribute the message in the user data field of the SCCP message to

said first DTAP if said discrimination parameter indicates the message in said user data field is a DTAP message belonging to said first group of messages,

said second DTAP if said discrimination parameter indicates the message in said user data field is a DTAP message belonging to said second group of messages,

said first BSSMAP if said discrimination parameter indicates the message in said user data field is a BSSMAP message belonging to said first group of messages,

said second BSSMAP if said discrimination parameter indicates the message in said user data field is a BSSMAP message belonging to said second group of messages.

6. A mobile radio system according to claim 4, wherein said single signalling interface is substantially similar to the GSM specific A-interface.

7. A mobile radio system, comprising

personal stations,

a mobile switch,

a radio system supporting a first radio interface for communication with a first group of said personal stations and a second interface for communication with a second group of said personal stations,

a single signalling interface between said mobile

switch and said radio system,

a first group of signalling messages corresponding to said first radio interface for signalling between said mobile switch and said radio system over said single signalling interface,

a second group of signalling messages corresponding to said second radio interface for signalling between said mobile switch and said radio system over said single signalling interface,

said single signalling interface comprising

a first direct transfer application sub-part DTAP for transferring DTAP messages in said first group of messages between said mobile switch and said first group of said personal stations via said single signalling interface and said radio system,

a first radio system management application sub-part RSMAP for transferring RSMAP messages in said first group messages between said mobile switch and said radio system,

a second direct transfer application sub-part DTAP for transferring DTAP messages in said second group of messages between said mobile switch and said second group of said personal stations via said single signalling interface and said radio system,

a second radio system management application sub-part RSMAP for transferring RSMAP messages in said second group messages between said mobile switch and said radio system,

a single signalling connection and control part SCCP for transferring said DTAP and BSSMAP messages in an user data field of a SCCP message over said single signalling interface,

said user data field of said SCCP

message containing a distribution data unit, a
lenght indicator and said DTAP or RSMAP message to
be transferred,

said distribution data unit
containing a discrimination parameter, at least one
bit of said discrimination parameter indicating
whether the message in said user data field of said
SCCP message is a RSMAP message or a DTAP message,
and one or more of the remaining bits of said
discrimating parameter indicating whether said
message in said user data field of said SCCP
message belongs to said first group of messages or
said second group of messages,

an intermediate layer between the
SCCP and DTAP and RSMAP and for managing said
discrimination parameter and for discrimination
between said DTAP and RSMAP messages belonging to
said first and second groups of messages.

8. A mobile radio system according to claim 7,
wherein said intermediate layer is responsive to said
discrimination parameter in a received SCCP message to
distribute the message in the user data field of the SCCP
message to

said first DTAP if said
discrimination parameter indicates the message in
said user data field is a DTAP message belonging to
said first group of messages,

said second DTAP if said
discrimination parameter indicates the message in
said user data field is a DTAP message belonging to
said second group of messages,

said first RSMAP if said
discrimination parameter indicates the message in
said user data field is a RSMAP message belonging
to said first group of messages,

said   second   RSMAP   if   said
discrimination parameter indicates the message in
said user data field is a RSMAP message belonging
to said second group of messages.

5   9. A mobile radio system according to claim 7,
wherein said single signalling interface is a Signalling
system Number 7 (SS7) based A-interface PN-3343.

10. A signalling method in a mobile radio system,
comprising steps of

10   utilizing at least two different radio interfaces
for communication between a base station system and a
plurality of mobile stations,

utilizing a dedicated signalling protocol for each
of said at least two different radio interfaces,

15   utilizing a single signalling interface for
signalling between said base station system and a mobile
switch, said single signalling interface supporting each
of said dedicated signalling protocols,

associating a discrimination parameter with each

20   signalling message transferred through said single
signalling interface, for separating signalling messages
belonging to different signalling protocols from each
other in said single signalling interface, a dedicated
value of said discrimination parameter being allocated to

25   each of said radio multiple radio interfaces.

11. A mobile radio system, comprising
personal stations,
a mobile switch,
a radio system supporting a first radio interface

30   for communication with a first group of said personal
stations and a second interface for communication with a
second group of said personal stations,

a single signalling interface between said mobile
switch and said radio system,

35   a first group of signalling messages corresponding

to said first radio interface for signalling between said
mobile switch and said radio system over said single
signalling interface,

a second group of signalling messages corresponding
to said second radio interface for signalling between said
mobile switch and said radio system over said single
signalling interface,

said single signalling interface comprising

a first direct transfer application
sub-part DTAP for transferring DTAP messages in
said first group of messages via said single
signalling interface and said radio system,

a first radio system management
application sub-part RSMAP for transferring RSMAP
messages in said first group messages between said
mobile switch and said radio system,

a second direct transfer
application sub-part DTAP for transferring DTAP
messages in said second group of messages between
said mobile switch and said second group of said
personal stations via said single signalling
interface and said radio system,

a second radio system management
application sub-part RSMAP for transferring RSMAP
messages in said second group messages between
said mobile switch and said radio system,

a single signalling connection and
control part SCCP for transferring said DTAP and
BSSMAP messages in an user data field of a SCCP
message over said single signalling interface,

said user data field of said SCCP
message containing a distribution data unit, a
lenght indicator and said DTAP or RSMAP message to
be transferred,

said distribution data unit

containing a discrimination parameter, at least one
bit of said discrimination parameter indicating
whether the message in said user data field of said
SCCP message is a RSMAP message or a DTAP message,

5   and one or more of the remaining bits of said
discrimating parameter indicating whether said
message in said user data field of said SCCP
message belongs to said first group of messages or
said second group of messages,

10   an intermediate layer between the
SCCP and DTAP and RSMAP and for managing said
discrimination parameter and for discrimination
between said DTAP and RSMAP messages belonging to
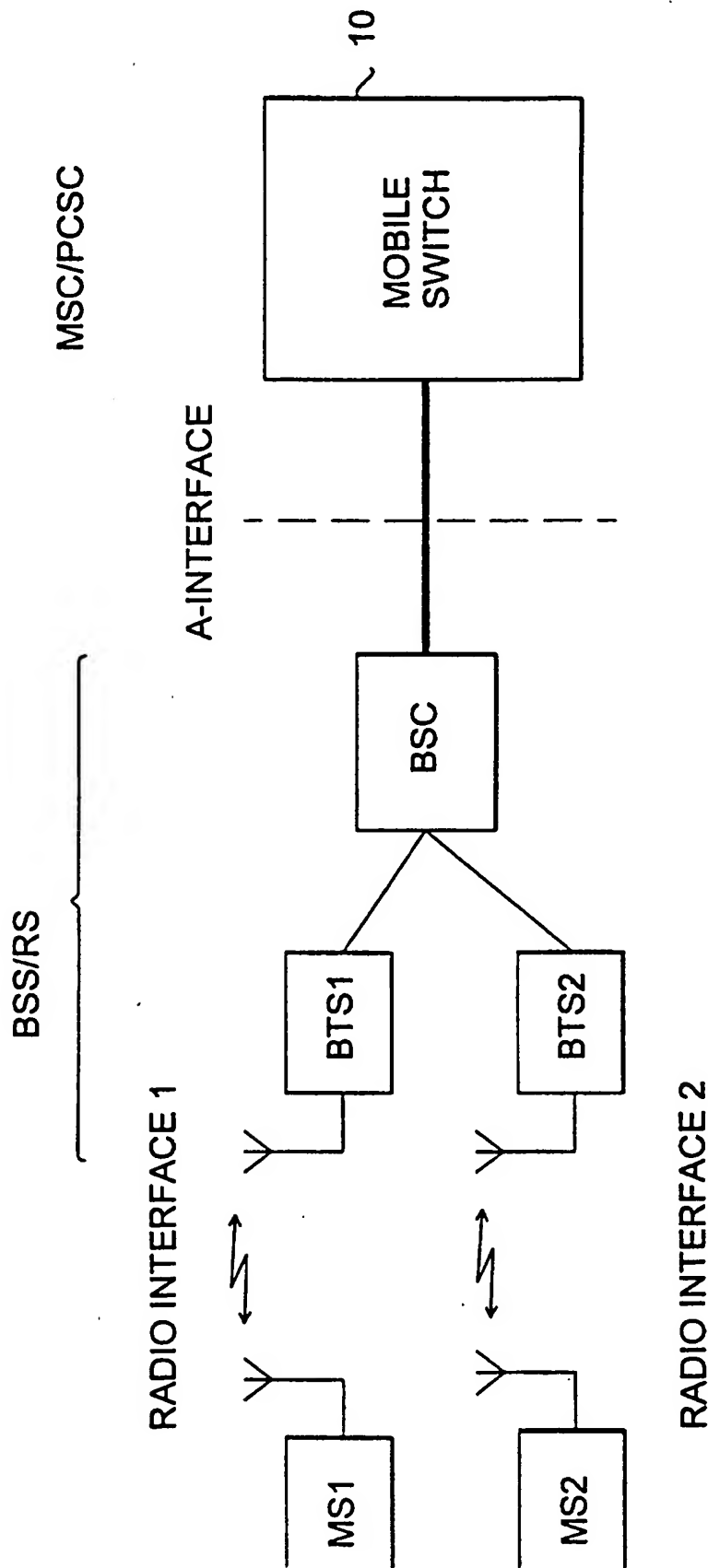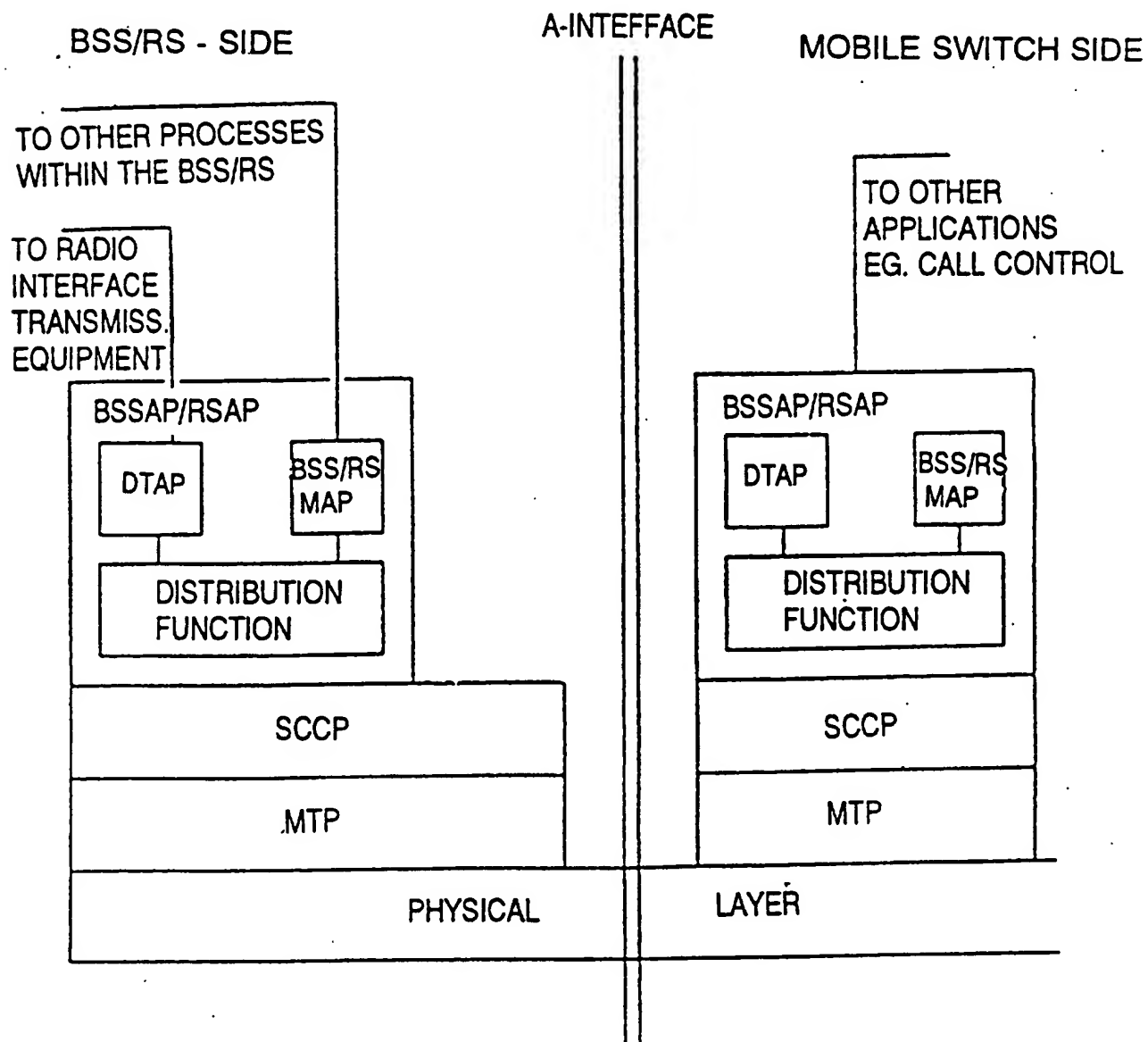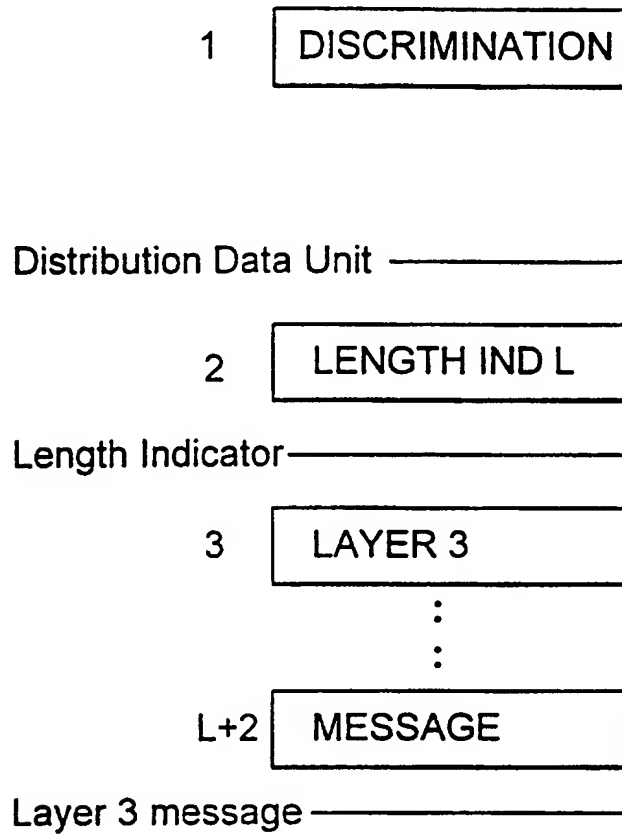said first and second groups of messages.

MSC/PCSC

MOBILE
SWITCH

10

A-INTERFACE

BSC

BSS/RS

BTS1

BTS2

RADIO INTERFACE 1

RADIO INTERFACE 2

MS1

MS2

FIG. 1

FIG. 2

BSSMAP/RSMAP

1 | DISCRIMINATION |

Distribution Data Unit ————————

2 | LENGTH IND L |

Length Indicator ————————

3 | LAYER 3 |

⋮

L+2 | MESSAGE | FIG. 3

Layer 3 message ————————

DTAP

1 | DISCRIMINATION |

2 | DLCI |

——— Distribution Data Unit ———————

3 | LENGTH IND L |

Length Indicator ————————

4 | LAYER 3 |

⋮

L+3 | MESSAGE | FIG. 4

MSG1	Mandatory	Optional
MSG2	Mandatory	Optional
MSG3	Mandatory	Optional
MSGn	Mandatory	Optional

message group 1
for radio interface 1

.
.
.

MSG1	Mandatory	Optional
MSG2	Mandatory	Optional
MSG3	Mandatory	Optional
MSGn	Mandatory	Optional
MSGn+1	Mandatory	Optional

message group n
for radio interface n
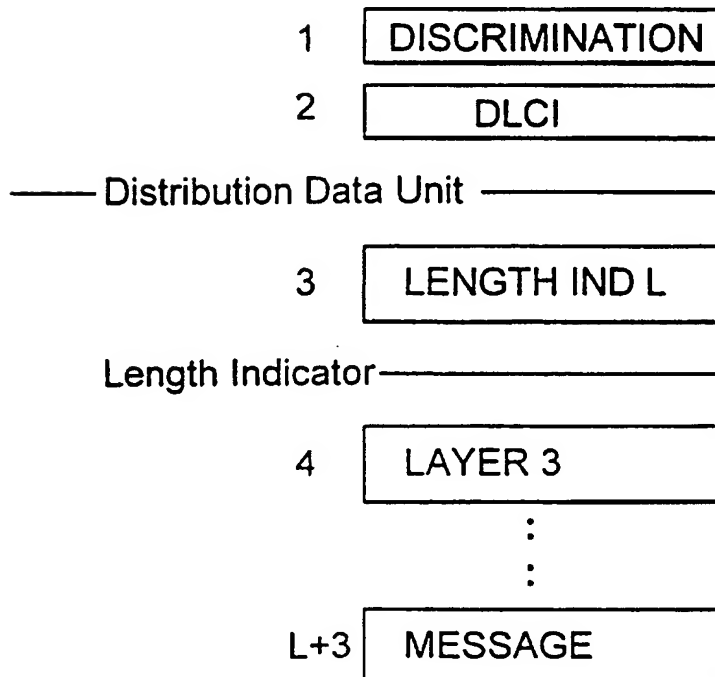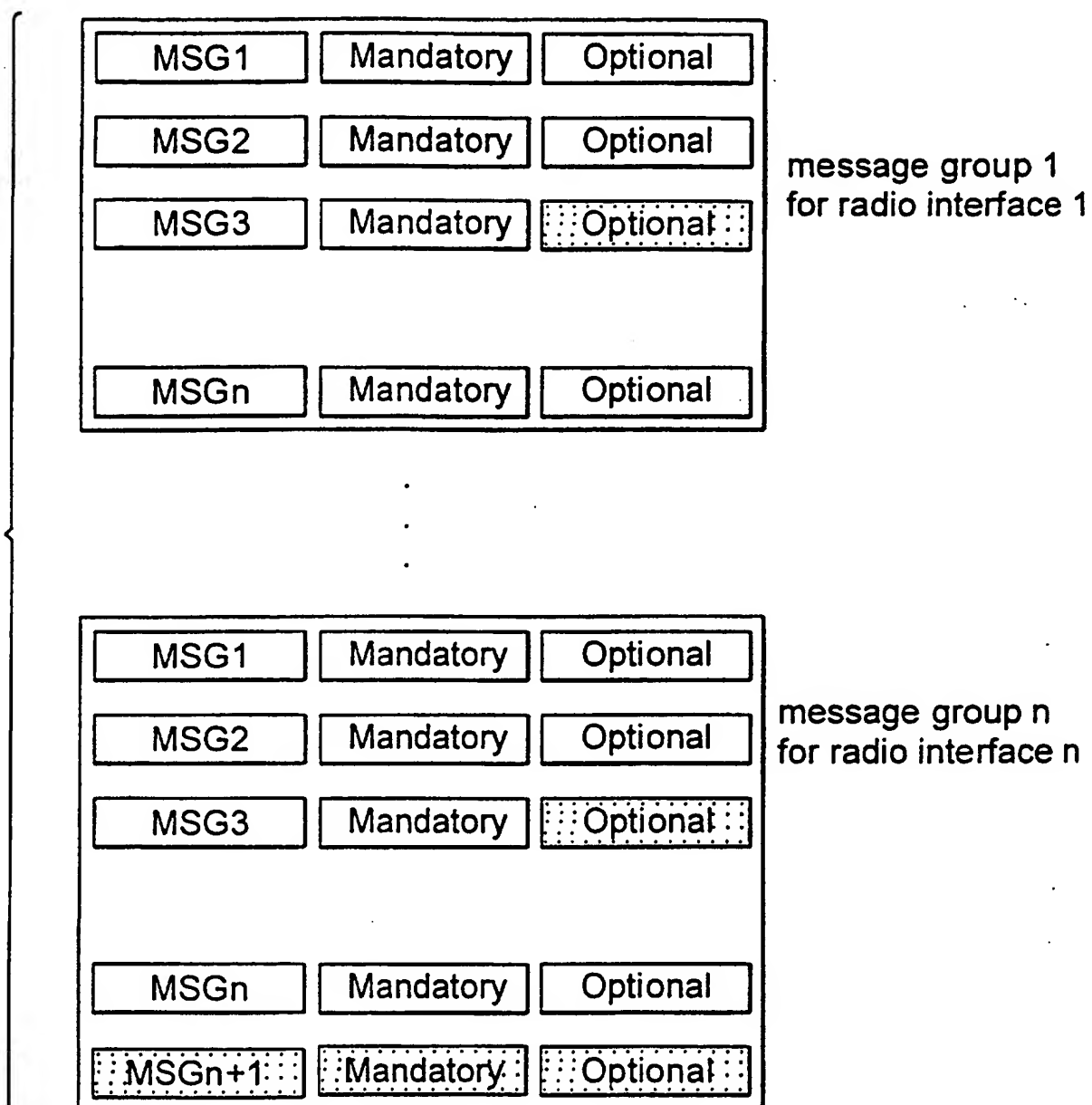
FIG. 5
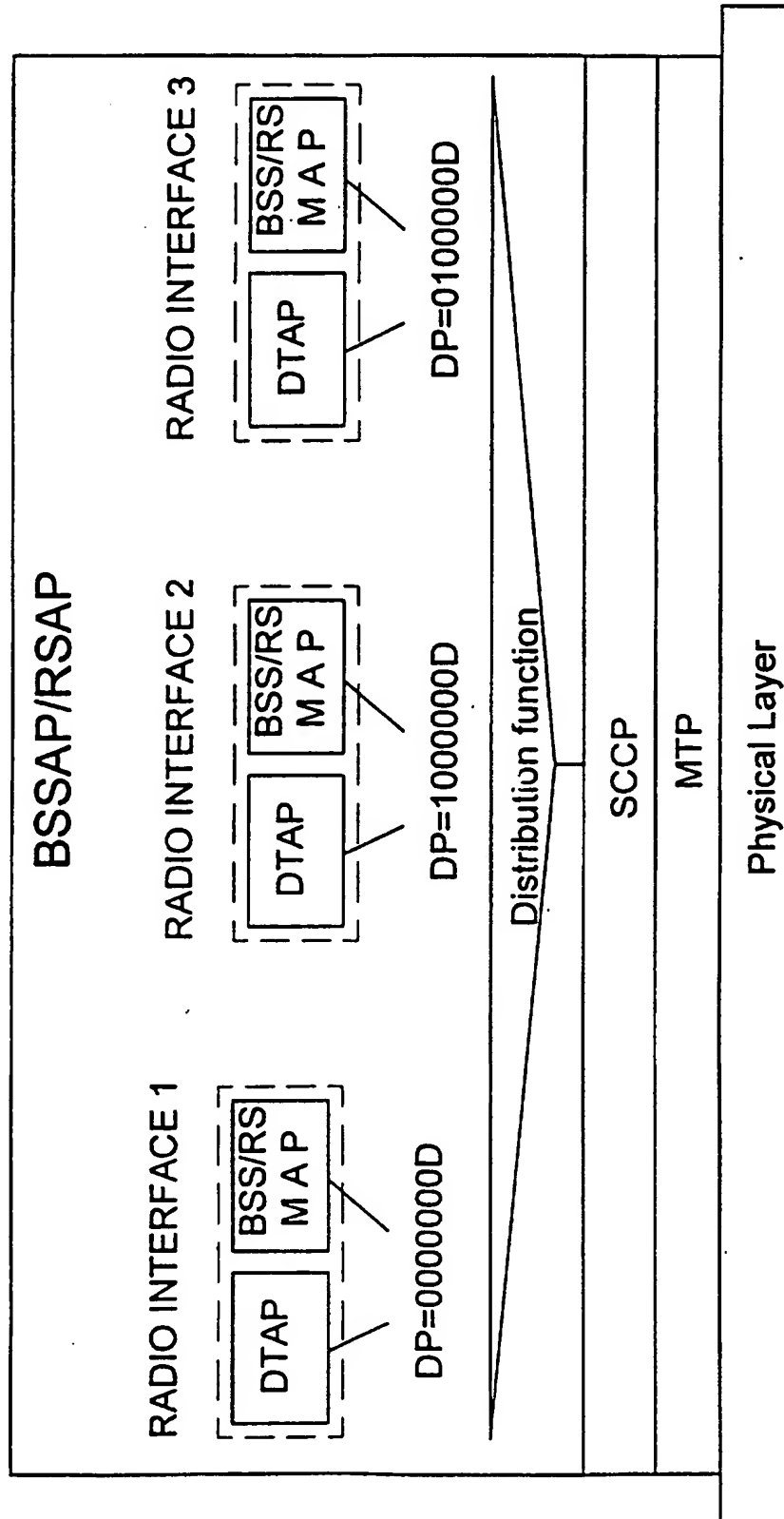
FIG. 6

```
        8 7 6 5 4 3 2 1
      ┌─────────────────────────┐
FIG. 7│  0 0 0 0 0 0 0 D        │
      └─────────────────────────┘
```

RADIO INTERFACE 1 MESSAGE
D = 1, DTAP MESSAGE
D = 0, BSSMAP MESSAGE

```
        8 7 6 5 4 3 2 1
      ┌─────────────────────────┐
FIG. 8│  1 0 0 0 0 0 0 D        │
      └─────────────────────────┘
```

RADIO INTERFACE 2 MESSAGE
D = 1, DTAP MESSAGE
D = 0, BSSMAP MESSAGE

```
        8 7 6 5 4 3 2 1
      ┌─────────────────────────┐
FIG. 9│  0 1 0 0 0 0 0 D        │
      └─────────────────────────┘
```

RADIO INTERFACE 3 MESSAGE
D = 1, DTAP MESSAGE
D = 0, BSSMAP MESSAGE